CLAIMS

What is claimed is:

1. An optical switching device, comprising:

an optical cavity having an input port and an output port; and

a phase modulator disposed within the optical cavity, the phase modulator having an input port and an output port respectively coupled to the input port and the output port of the optical cavity, wherein the phase modulator introduced a phase shift in a portion of an optical signal propagating in the optical cavity while the component signal is propagating in one direction, and introduces a phase shift in another portion of the optical signal propagating in another direction.

2. The optical switching device of claim 1, wherein the phase modulator comprises a Mach-Zehnder interferometer (MZI).

3. The optical switching device of claim 2, wherein the phase modulator comprises an electro-optic phase shifter.

4. The optical switching device of claim 2, wherein the phase modulator comprises a thermo-optic phase shifter.

5. The optical switching device of claim 2, wherein the phase modulator comprises a stress-optic phase shifter.

6. The optical switching device of claim 2 wherein the MZI comprises a Y-coupler.

7. The optical switching device of claim 2, wherein a first reflective facet and a second reflective facet are used in implementing the optical cavity.

8. The optical switching device of claim 7, wherein the first facet comprises a coating having a plurality of adjoining layers, each layer having an index of refraction that is different from that of an adjoining layer, the refractive indices alternating between higher and lower refractive indices.

9. The optical switching device of claim 7, wherein the first facet comprises a reflective grating.

10. An optical switching device, comprising:

an optical cavity having an input port and an output port; and

means, disposed within the optical cavity, for modulating a phase of a portion of an optical signal propagating in the optical cavity.

11. The optical switching device of claim 10, wherein the means for modulating comprises a Mach-Zehnder interferometer (MZI).

12. The optical switching device of claim 11, wherein the means for modulating comprises an electro-optic phase shifter.

13. The optical switching device of claim 11, wherein the means for modulating comprises a thermo-optic phase shifter.

14. The optical switching device of claim 11, wherein the means for modulating comprises a stress-optic phase shifter.

A6 15. The optical switching device of claim 11 wherein the MZI ~~comprises a~~ Y-coupler.

16. The optical switching device of claim 11, wherein a first reflective facet and a second reflective facet are used in implementing the optical cavity.

17. The optical switching device of claim 16, wherein the first facet comprises a coating having a plurality of adjoining layers, each layer having an index of refraction that is different from that of an adjoining layer, the refractive indices alternating between higher and lower refractive indices.

18. The optical switching device of claim 16, wherein the first facet comprises a reflective grating.

A7 19. A planar optical integrated optical circuit, comprising:

a first facet having a reflectance less than one;

a second fact having a reflectance less than one'

a first optical combiner coupled to the first facet;

a second optical combiner coupled to the second facet;

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a first arm having one end coupled to the first optical combiner and another end coupled to the second optical combiner;

a second arm having one end coupled to the first optical combiner and another end coupled to the second optical combiner; and

a phase shifter operatively coupled to the first and second arms.

20. The planar optical integrated optical circuit of claim 19, wherein the first and second facets each comprise a reflective grating.

21. The planar optical integrated optical circuit of claim 19, wherein the phase shifter is an electro-optic phase shifter, a thermo-optic phase shifter, or a stress-optic phase shifter.

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22. A method, comprising:

propagating an optical signal into an optical cavity;

causing a portion of the optical signal to propagate in one optical path and another portion of the optical signal to propagate in another optical path;

selectively introducing a phase difference between the portions of the optical signal;

combining the portions of the optical signal; and

propagating a portion of the combined signal out of the optical cavity.

23. The method of claim 22, wherein the optical cavity is a resonant optical cavity with respect to the optical signal.

24. The method of claim 22 wherein a reflective grating is used to form a part of the optical cavity.

25. The method of claim 22, wherein a Mach-Zendher Interferometer (MZI) is used to selectively introduce the phase difference.

26. The method of claim 25, wherein the MZI comprises a phase shifter selected from the group comprising an electro-optic phase shifter, a thermo-optic phase shifter, or a stress-optic phase shifter.

27. An optical switching device, comprising:

an optical cavity;

means for propagating an optical signal into the optical cavity;

means for causing a portion of the optical signal to propagate in one optical path and another portion of the optical signal to propagate in another optical path;

means for selectively introducing a phase difference between the portions of the optical signal;

means for combining the portions of the optical signal; and

means for propagating a portion of the combined signal out of the optical cavity.

28. The optical switching device of claim 27 wherein a reflective grating is used to form a part of the optical cavity.

29. The optical switching device of claim 27, wherein the means for selectively introducing a phase difference comprises a Mach-Zendher Interferometer (MZI).

30. The optical switching device of claim 29, wherein the MZI comprises a phase shifter selected from the group comprising an electro-optic phase shifter, a thermo-optic phase shifter, or a stress-optic phase shifter.